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EXAMINER	
INADOMI, MICHAEL J	
ART UNIT	PAPER NUMBER
2871	

NOTIFICATION DATE	DELIVERY MODE
11/09/2012	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/603,990	NAM ET AL.	
	Examiner	Art Unit	
	Michael Inadomi	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 March 2012*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-5,8-15 and 17-21* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-5,8-15 and 17-21* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *22 March 2011* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 7, 2012 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 8, 9, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ha et al. (US PGPub No. 2003/0058389 A1) in view of Maeda et al. (US PGPub No. 2002/0140887 A1).

Regarding **claim 1**, Ha et al. teach a transflective liquid crystal display device (see Figs. 10A-10D with reference to Fig. 3), comprising a substrate 311 having a switching portion, a reflective portion not overlapping the switching portion, and a transmissive portion overlapping neither the switching portion nor the reflective portion, a pixel region being defined to include the reflective and transmissive portions (see Fig. 3), a gate line 325 (see paragraph 67) on the substrate, a data line 338 crossing the gate line (see Fig. 3), a thin film transistor connected to the

gate line and the data line and including a gate electrode 323, an active layer 331, and source and drain electrodes 335 and 337 (see paragraph 67), the thin film transistor and the drain electrode being on the switching portion (see Fig. 3), and the drain electrode being an electrode directly connected to a drain region of the thin film transistor (see Fig. 10D) and not overlapping the pixel region, wherein the thin film transistor is disposed within the switching portion.

Ha et al. further teach a first insulating layer 343 within the reflective portion, a second insulating layer 353 (see paragraph 70 and Fig. 10D) made of an organic material on the first insulating layer, the second organic material layer having an open portion 357 at the transmissive portion, a reflective layer 349 on the first insulating layer having a transmissive hole at the open portion (see Fig. 10D), the reflective layer disposed on the pixel region and not overlapping the drain electrode, and a pixel electrode 365 on the reflective layer and in direct contact with the drain electrode (see Fig. 10D). Ha et al. further teach (see paragraph 9 and Fig. 2) an opposing substrate 15 facing the substrate and a common electrode 13 on an inner surface of the opposing substrate, the common electrode being substantially flat.

Ha et al. do not explicitly disclose the presence of a plurality of uneven patterns consisting of a first organic material layer within the reflective portion but not formed over the switching portion, the uneven patterns partially covering the substrate, a second organic material layer on the first organic material layer, the second organic material layer having an open portion at the transmissive portion, and a reflective layer on the second organic material layer having a transmissive hole at and corresponding to the open portion.

However, Maeda et al. teach an analogous transflective LCD (see Fig. 10K) wherein the insulating layer under the reflective layer 31 and the pixel electrode 81 has a plurality of uneven

patterns consisting of a first organic (see paragraph 74) material layer 51 within the reflective portion, the uneven patterns partially covering the substrate, and a second organic material layer 52 on the first organic material layer, wherein the organic material layers help to create uniform reflection characteristics over an image-forming plane (see paragraph 56).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the invention of Ha et al. by providing the first insulating layer 343 of Ha et al. as a thin inorganic passivation layer analogous to layer 54 of Maeda et al., providing a plurality of uneven patterns consisting of a first organic material layer throughout the reflective portion, at least two of which are not formed over the switching portion, the uneven patterns partially covering the substrate, providing the second insulating layer 353 of Ha et al. as a second organic material layer on the first organic material layer, and providing the reflective layer on the second organic material layer, as taught by Maeda et al., motivated by the desire to make the surface of the reflective layer bumpy in order to diffusely and evenly reflect light off the surface of the reflective layer, thus improving display quality.

The examiner notes that a person having ordinary skill in the art would have maintained the open portion 357 of Ha et al. in the second organic material for the purpose of matching the retardation of the transmissive and reflective portions (see paragraph 70 of Ha et al.). In addition, a person having ordinary skill in the art would have found it obvious not to provide the plurality of uneven patterns so as to be formed over the switching portion due to the fact that, as discussed above, the reflective portion of Ha et al. does not overlap the switching portion of Ha et al. and thus there would be no reason to provide the plurality of uneven patterns over the switching portion, as such a disposal may negatively affect the planarizing ability of the second

organic material layer 353 and thereby cause an unnecessary lack of cell gap uniformity in the switching portion, risking the formation of liquid crystal disclination regions and decreased display quality.

Even if it were not obvious to provide the switching portion so as not to have uneven patterns formed thereon, the formation of uneven patterns throughout the reflective portion would, regardless of the number of uneven patterns formed over the switching portion, result in the existence of some group of uneven patterns, wherein each uneven pattern of the group is not formed over the switching region, which could be defined as a plurality of uneven patterns consisting of a first organic material layer within the reflective portion, the uneven patterns partially covering the substrate, and wherein the plurality of uneven patterns are disposed within the reflective portion but are not formed over the switching portion.

Regarding **claim 2**, the first and second organic material layers are formed from a photosensitive material comprising a photo-acrylic resin PC403 (see paragraph 74 of Maeda et al.).

Regarding **claim 3**, the first and second organic material layers are formed from a photosensitive material comprising a photo-acrylic resin PC403 (see paragraph 74 of Maeda et al.).

Regarding **claim 4**, Ha et al. teach the presence of an inorganic material layer 343 covering the gate line, the data line, and the thin film transistor (see Fig. 10D and paragraph 71).

Regarding **claim 5**, Ha et al. further teach the inorganic material layer as being formed of one of silicon nitride and silicon oxide (see paragraph 68).

Regarding **claim 8**, Ha et al. further teach the presence of a gate pad 327 connected to the gate line (see Fig. 3 and paragraph 67), a data pad 341 connected to the data line, and a capacitor electrode 339 overlapping the gate line.

Regarding **claim 9**, in the invention Ha et al. as modified by Maeda et al., the second organic material layer is formed as a replacement of the second insulating layer 353 of Ha et al., which has a drain contact hole 355 (see Fig. 10D) exposing the drain electrode, a gate pad contact hole 361 exposing the gate pad, and a data pad contact hole 363 exposing the data pad. At the time of the invention, it would have been obvious to a person having ordinary skill in the art in the above modification of Ha et al. by Maeda et al. to form the second organic material layer to have those same contact holes in order to facilitate electrical connections between various parts of the device.

Regarding **claim 21**, the invention of Ha et al. as modified by Maeda above further teaches the presence of inorganic material layer 343 covering substantially the entire surface of the substrate including the gate line, the data line, and the thin film transistor (see Fig. 10D and paragraph 71 of Ha et al.). As discussed above, a plurality of uneven patterns consisting of a first organic material layer covers portions of the inorganic material layer within the reflective portion. As the patterns are uneven, the reflective portion and pixel region may be defined to contain at least one peripheral portion wherein the uneven patterns do not cover portions of the inorganic material layer. Uncovered portions of this inorganic material layer are covered by the second organic material layer.

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ha et al. (US PGPub No. 2003/0058389 A1) as modified by Maeda et al. (US PGPub No. 2002/0140887 A1), as applied to claim 1 above, and further in view of Kubota et al. (US PGPub No. 2002/0171792 A1).

Regarding **claim 10**, the invention of Ha et al. as modified by Maeda et al. teaches all the limitations of claim 1 as previously discussed, wherein the transflective liquid crystal display device of Ha et al. as modified by Maeda et al. includes first and second substrates facing into and spaced apart from each other (the substrate having a gate line and data line thereon as discussed in the above rejection of claim 1 being the first substrate and the previously mentioned opposing substrate being the second substrate), the first and second substrates having a switching portion, a reflective portion, and a transmissive portion, a pixel region being defined to include the reflective and transmissive portions, a liquid crystal layer 14 (see Figs. 1 and 2 of Ha et al.) interposed between the common electrode and the pixel electrode, wherein the pixel electrode and the common electrode are separated by a first cell gap in the transmissive portion, and a second cell gap in the reflective portion (see Fig. 10D). However, the invention of Ha et al. as modified by Maeda et al. does not explicitly disclose the first cell gap as being twice greater than the second cell gap.

Kubota et al. teach an analogous transflective liquid crystal display wherein a first cell gap in a transmissive portion is twice greater than a second cell gap in a reflective portion (see paragraph 84). At the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the invention of Ha et al. as modified by Maeda et al. to have the first cell gap twice greater than the second cell gap, as taught by Kubota et al., in order to

match the retardation of the liquid crystal layer in the reflective and transmissive portions and thereby improve display quality.

Regarding **claim 11**, the difference in cell gaps is provided by the height of the organic material layers, and for the first (transmissive) cell gap to be twice the second (reflective) cell gap, the height needs to be equal to the second cell gap. The uneven patterns are equal to or less than this height, so they have a height equal to or less than the second cell gap. Even were this not true, adjusting the height of the uneven patterns to improve the reflective properties of the reflective layer, or to optimize the relative cell gaps for better liquid crystal behavior, would have been obvious to one of ordinary skill in the art at the time of the invention, motivated by the desire to optimize these features of the device.

Claims 12-15 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ha et al. (US PGPub No. 2003/0058389 A1) as modified by Maeda et al. (US PGPub No. 2002/0140887 A1) and Kubota et al. (US PGPub No. 2002/0171792 A1), as applied to claim 10 above, and further in view of admitted prior art.

Regarding the additional limitations of **claim 12** over claim 10, the invention of Ha et al. as modified by Maeda et al. discloses the method of fabricating the above LCD, including formation of the first and second organic material layers from a photosensitive material (see paragraph 74 of Maeda et al.) except perhaps for the step of performing an exposure and development process on the first and second photosensitive organic material layers. Maeda et al. discuss using organic layers which are photosensitive, but do not necessarily disclose the particular patterning steps recited. The admitted prior art (see page 7 of the office action mailed

June 3, 2010) states that performing an exposure and development process on organic layers was well known. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so, motivated by this being the standard technique for patterning organic materials in the art.

Regarding **claim 13**, the invention of Ha et al. as modified by Maeda et al., Kubota et al., and admitter prior art teaches the first and second photosensitive material layers as being formed of the photo-acrylic resin PC403, made by JSR Co. (see paragraph 74 of Maeda et al.).

Regarding **claim 14**, Ha et al. teach the method as further comprising forming an inorganic material layer 343 covering the gate line, the data line, and the thin film transistor (see Fig. 10D and paragraph 71).

Regarding **claim 15**, Ha et al. further teach the inorganic material layer as being formed of one of silicon nitride and silicon oxide (see paragraph 68).

Regarding **claim 17**, Ha et al. further teach the formation of a gate pad 327 connected to the gate line (see Fig. 3 and paragraph 67), a data pad 341 connected to the data line, and a capacitor electrode 339 overlapping the gate line.

Regarding **claim 18**, in the invention Ha et al. as modified by Maeda et al., Kubota et al., and admitted prior art, the second organic material layer is formed as a replacement of the second insulating layer 353 of Ha et al., which has a drain contact hole 355 (see Fig. 10D) exposing the drain electrode, a gate pad contact hole 361 exposing the gate pad, and a data pad contact hole 363 exposing the data pad. At the time of the invention, it would have been obvious to a person having ordinary skill in the art in the above modification of Ha et al. by Maeda et al.

to form the second organic material layer to have those same contact holes in order to facilitate electrical connections between various parts of the device.

Regarding the additional limitations of **claim 19** over claim 10, the invention of Ha et al. as modified by Maeda et al. discloses the method of fabricating the above LCD, including formation of the first and second organic material layers from a photosensitive material (see paragraph 74 of Maeda et al.) except perhaps for the step of performing an exposure and development process on the first and second photosensitive organic material layers. Maeda et al. discuss using organic layers which are photosensitive, but do not necessarily disclose the particular patterning steps recited. The admitted prior art (see page 7 of the office action mailed June 3, 2010) states that performing an exposure and development process on organic layers was well known. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so, motivated by this being the standard technique for patterning organic materials in the art.

Regarding **claim 20**, the invention of Ha et al. as modified by Maeda et al., Kubota et al., and admitted prior art teaches the plurality of uneven patterns being formed to have a height equal to or less than the second cell gap, as discussed in the above rejection of claim 11 under 35 U.S.C. 103(a).

Response to Arguments

Applicant's arguments filed March 7, 2012 have been fully considered but they are not persuasive.

Applicant states on pages 11 and 12 of the Remarks that since Maeda et al. teach a configuration wherein a plurality of uneven patterns are formed over a switching portion, Maeda et al. and Ha et al. may not be combined to arrive at the presently claimed invention wherein a plurality of uneven patterns are not formed over the switching portion.

The examiner asserts that even if the invention of Ha et al. as modified by Maeda et al. could only be combined so as to require the presence of some number of uneven patterns formed over the switching portion, the presence of any two uneven patterns (the minimum number of uneven patterns necessary to form a plurality) within the reflective portion but not formed over the switching portion would result in those two uneven patterns being a plurality of uneven patterns which are disposed within the reflective portion but are not formed over the switching portion. The two aforementioned uneven patterns would fulfill the limitation discussed by Applicant regardless of the number of uneven patterns formed over the switching portion, as Applicant has not presented a limitation in any claim requiring an absence of any uneven pattern formed over the switching portion.

The examiner further asserts that the mere fact that Maeda et al. show uneven patterns formed over a switching portion does not prevent Maeda et al. from being used to perform obvious modifications of Ha et al. to arrive at the presently claimed invention. The teachings of Maeda et al. pertaining to organic material layers and the use of uneven patterns may still be applied to the invention of Ha et al. without necessitating formation of uneven patterns (which are present in order to improve reflective display characteristics, as discussed in paragraph 56 of Maeda et al.) in a region where no reflective layer is present, as there is rationale for such a modification as discussed in at least the above rejection of claim 1 under 35 U.S.C. 103(a).

This being the case, Applicant's arguments have not been found to be persuasive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Inadomi whose telephone number is (571)270-7808. The examiner can normally be reached on Monday through Friday, 11 a.m. through 8:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bumsuk Won can be reached on 571-272-2713. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. I./
Examiner, Art Unit 2871

/Bumsuk Won/
Supervisory Patent Examiner, Art Unit 2871